

## Neuroscience and the Law

Fall 2017

CRN 89278, NEUR 4984

3 credits, Grading: A/F

Tuesdays & Thursdays, 2:00 – 3:15 pm Eastern

Location: Torgensen Hall, Room 1000

**Instructor:** Dr. Francis X. Shen, J.D., Ph.D.  
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**Note:** This course is being taught *primarily via WebEx video*, with in-person class sessions noted in Part V of this syllabus.

**VTU course Assistant:** Sarah Carl, [sarahcarl@vt.edu](mailto:sarahcarl@vt.edu)

**Description:** Neuroscience is increasingly finding its way into law, politics, and business. This raises practical questions about whether and how brain science can add value in these fields, tactical questions about how best to position neuroscience relative to traditional social science insights, and ethical questions about the legitimacy of brain-based approaches. This course will introduce students to the new field of neurolaw by covering issues such as the neuroscience of criminal culpability, brain-based lie detection, cognitive enhancement, emotions, decision making, and much more. Along the way we'll discuss how the legal system can and should respond to new insights on topics such as adolescent brain development, addiction, psychopathy, Alzheimer's, the effects of combat on soldiers' brains, and concussions from sports injuries. The course will also consider the governance of emerging technologies such as artificial intelligence, brain-machine interface, and virtual reality. Emphasis will be placed on exposing students to possible career tracks in which a neuroscience background may be advantageous. Students will be required to complete small-group projects and one final paper of 20-25 pages. (Note that all legal material in the seminar will be presented in an accessible manner, so no previous exposure to law or policy is required.)

**Prerequisites:** This course is designed as a senior seminar format course, aimed at advanced students who have taken a fairly rich complement of neuroscience classes including Intro 1 & 2. Additional coursework, such as Cognitive Neuroscience and Cell & Molecular, is recommended but not required. No background in law, economics, or policy is presumed or required.

**Office Hours:** (Virtual) Thursdays, 3:15-5:00 pm and by appointment

**Readings:** The required book is: OWEN D. JONES, JEFFREY D. SCHALL & FRANCIS X. SHEN, *LAW AND NEUROSCIENCE: CASES AND MATERIALS ON NEUROLAW* (2014, Aspen Publishers). The majority of readings will be from the coursebook. Additional readings will be posted on the course web site.

**Requirements:** Successful completion of the course requires: (1) regular attendance; (2) regular participation in classroom discussion and activities; (3) timely completion of all assignments (described below).

**Canvas:** The canvas site for the course is: <https://canvas.vt.edu/courses/57059>

## I. Law and Neuroscience <sup>1</sup>

Brain science has become a part of our lives. Parents make decisions about altering their child's brain chemistry through drug treatments for attention deficit disorder. Children grapple with the aging brains of their parents when cases of Alzheimer's and dementia arise. Schools and coaches think about the impact of brain trauma on the sports field, and the military thinks about the impact of combat on the brains of soldiers. Billions of research dollars are spent to better understand addiction, control impulsive behavior, and improve cognitive performance.

The legal system too is starting to see more brain science in its midst. The integration of neuroscience and law ("neurolaw") is a hot topic in legal and neuroscientific circles. In the popular press, the *New York Times Magazine* has run a cover story on neuroscience and law; "neuroscience in court" was named – by the preeminent scientific journal *Science* – as one of the top seven topics to watch; and the MacArthur Foundation has invested nearly \$15,000,000 to support a *Research Network on Law and Neuroscience*. In the courtroom, although the absolute number of neurolaw cases remains small, the data suggest we are in a period of exponential growth.

The future of law and neuroscience remains unknown, and at present the field is just in its infancy. As you'll see from this syllabus, law and neuroscience has the potential to encompass many things. Most importantly for you, neurolaw is an interdisciplinary area of inquiry that is still uncharted territory – ripe for exploration by young, intrepid legal and scientific minds!

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<sup>1</sup> A note on terminology: "Neuroscience", as we are using the term, is analogous to "brain sciences" or "study of the brain". The term neuroscience derives from the word "neuron" – which is the special type of cell that our brains rely on to function. The phrases "Law and Neuroscience", "Neuroscience and Law", "Law and the Brain" and "Neurolaw" will be used interchangeably to refer to the application of neuroscience findings to law (broadly defined).

## II. Course Aims and Objectives

*Aims.* This course has several interrelated aims: (1) to introduce you to the most important questions emerging from the intersection of law and neuroscience; (2) to foster interdisciplinary dialogue between the legal, psychology, and neuroscience communities; and (3) to encourage undergraduate students to see the legal implications of neuroscience research. In this class, students will be introduced to a variety of ways in which the legal and policy system operates; be exposed to a many legal and policy implications of neuroscience research; and learn about how future neuroscience research may further improve law and public policy.

*Specific Learning Objectives.* By the end of this class, students will:

- ✦ Gain exposure to the many ways in which neuroscience research is being deployed in legal contexts such as criminal proceedings, civil litigation, state and federal legislation, regulatory oversight, and policy evaluation.
- ✦ Think critically about whether, and under what conditions, neuroscientific evidence should be admitted in courtroom proceedings.
- ✦ Learn a set of scientifically relevant law basics – how laws are made and enforced; how the U.S. legal system operates; and how scientific evidence is (or is not) used in lawmaking and legal adjudication.
- ✦ Develop a better understanding of how neuroscience research might be designed in order to improve law and policy.

## III. Course Format and Procedures

This is a three-credit course. The course will meet for 1 hours and 15 minutes twice a week over the course of the semester. Each class session will involve a mix of lecture and discussion, all focusing on the week's reading material.

Course materials and announcements will be provided through a mix of postings to the Canvas course site, *and* via email *to your vt.edu* email address. You are expected to regularly check your vt.edu email in order to keep up to date with the course.

Just as the law students may at first be bewildered by the brain, so you may find yourself initially lost in the language of law. No legal background is required, and I will be available both in and outside of class to get you up to speed on the legal basics you need to know.

While the final writing assignment will comprise the majority of your grade, you will also be submitting written posts before each class, and making a brief, 60 second “sound bite” oral presentation on an assigned day. Additional information on the sound

bite oral presentation is provided at the end of this syllabus, and more guidance, as well as the topics, will be provided in class.

In addition, writing in the course will generally be evaluated using the following rubric, with an emphasis on writing clearly and precisely, with proper citation to legal authority.

	<b>Not Good</b>	<b>Good</b>	<b>Better</b>	<b>Best</b>
<b>Precision / Clarity</b>	The writing is imprecise and unclear.	The writing is mostly precise, but leaves the reader guessing at crucial points.	The writing is precise in all of its major claims, but becomes unclear or convoluted along the way.	The writing is precise throughout, with great attention paid to detail.
<b>Legal Authority</b>	The paper does not cite the proper legal authority (or mis-understands it).	The paper cites the proper legal authority, and understands the basic holdings.	The paper cites the proper legal authority and at least attempts to analyze / explain its complexities.	The paper cites the proper legal authority and demonstrates unique depth in its analysis of that law.

In keeping with University policy, letter grades will be assigned as follows: A (Excellent), A-, B+, B (Good), B-, C+, C (Fair), C-, D+, D, D- (Barely Passing), F (Failure), and I (Incomplete).<sup>2</sup>

#### IV. Class Assignments and Modes of Assessment

##### 1. Class participation, including weekly posting on discussion board (20% of final grade)

- a. **Class attendance policy:** Class attendance and active participation both in class and through e-communication, is required. You are expected to attend class regularly, complete all of the assignments noted below, and be an active member of the class during discussion periods. Attendance will be taken daily, and more than two unexcused absences may result in a reduction of the final overall class grade. Note also that excessive absences may result in a failing grade for the course.
- b. This is a class in which active participation with classmates and meaningful engagement with class materials is expected. Class participation includes timely submission of the canvas postings; regular attendance, thorough preparation of reading and written assignments; scholarly, and constructive critique of readings; adherence to the cell phone and laptop policies discussed below; and avoidance of unexcused absences.
- c. **Canvas posting:** At least once each week (i.e. before either the Tuesday or the Thursday class), you are required to post a short written response /

<sup>2</sup> <http://www.undergradcatalog.registrar.vt.edu/0809/acapolicies/grades.html>

reaction on the course canvas web site. This reaction may respond to one of the readings, propose discussion questions, or link to related news stories or research. The posts will be used to generate student-led discussion on many topics. To earn credit, the post must be made no later than 12:00 pm eastern time on the day of class.

**2. Preparation of executive summary and presentation of business idea or policy proposal (15% of final grade)**

- a. You will work in small groups to develop new ideas at the intersection of neuroscience and law. These project proposals might include, for instance, an idea for a new company; a new policy that should be enacted by a governmental agency, a new strategy for running a political campaign, and so forth. Emphasis will be placed on being critical and realistic about the limits of neuroscience in aiding these fields.
- b. You will submit a 1-page executive summary by 5:00 pm eastern time on Tuesday, Nov 7, and make a 3 minute group presentation in class (followed by Q&A) on Thursday, Nov 9.

**3. Paper outline (5% of final grade)**

- a. You will be composing a final paper. By approximately midway through the semester (adjustable depending on individual circumstances) you will be required to submit to me a short outline for your paper.
- b. Unless an individual exception applies, the paper outline will be due by 5:00 pm eastern time on Monday, October 9, in order to allow individual feedback from the professor before completion of the final paper.
- c. Note: In choosing your research proposal or paper topic, I encourage you to speak with me outside of class. There are many interesting questions to ask in the field of neurolaw, and many creative ways to answer those questions. Your paper and your education benefit most when you write on a topic that particularly interests you. Consequently, you should develop your topic very carefully, so that it is something you will enjoy exploring. Experience suggests that a narrow topic explored in some depth makes for a better paper, and a more fulfilling experience, than a broad topic explored superficially.

**4. Final research paper (60% of final grade)**

- a. Each student will complete a final research paper on a topic to be determined in consultation with the professor.
- b. The paper must be 20-25 pages (no shorter and no longer), and must be analytic rather than descriptive in nature.
- c. You will also provide a non-graded :60 second “elevator pitch” of your paper’s central argument in class on Thursday, Nov 9.
- d. The paper will be due by 5:00 pm eastern time on Wednesday, December 13, 2017.

## V. Schedule of Topics and Assignments

*Notes:* Unless noted below in yellow highlight, this class will be taught via WebEx. Please note the two re-scheduled classes, to accommodate additional in-person instruction. Also note that this schedule may be adjusted to reflect guest speaker availability. All “Chapter” references below refer to the Jones et al, Law and Neuroscience (2014) textbook.

Date	Topic	Reading
Tues, Aug 28 * Taught in person at VT	Introduction to Neuroscience and Law	Chapter 1
Wed, Aug 29 * Re-scheduled class taught in person at VT	Life and (Brain) Death	Chapter 10
Tues, Sept 5	The Case of the Murdering Brain	Chapter 2
Thur, Sept 7	The Case of the Adolescent Brain	Chapter 3
Tues, Sept 12	How the Law Works (Introduction to American Legal System)	Readings posted on Canvas
Thur, Sept 14	The Case of the Aging Brain	Readings posted on Canvas
Tues, Sept 19	Neuroscience and Responsibility: Do we have free will?	Chapter 5
Thur, Sept 21	Neuroscience in the Courtroom	Chapter 6
Tues, Sept 27	Brain Injury	Chapter 11
Thur, Sept 29	Sports Concussions	
Tues, Oct 3	Sports Concussions	Readings posted on Canvas
Thur, Oct 5	Pain and Distress	Chapter 12
Tues, Oct 10	Pain and Distress	No new reading
Thur, Oct 12	Memory and the Law	Chapter 13
Tues, Oct 17	Lie Detection	Chapter 15
Thur, Oct 19	Lie Detection	Chapter 15
Tues, Oct 24	Mobile Neurotechnology	Readings posted on canvas
Thur, Oct 26	Neuroeconomics, Neuromarketing	Readings posted on canvas
Tues, Oct 31	Neuropolitics	Readings posted on canvas
Thur, Nov 2	Neuroeducation	Readings posted on canvas
Tues, Nov 7	Judging and Decision-Making	Chapter 16
Thur, Nov 9 * Taught in person at VT	Individual :60 second presentations + Group Presentations	Read the one-pagers from each small group.
Tues, Nov 14	Addiction	Chapter 18
Thur, Nov 16	Addiction	Chapter 18
<del>Tues, Nov 21</del>	<i>No class – Thanksgiving Break</i>	
<del>Thur, Nov 23</del>	<i>No class – Thanksgiving Break</i>	

<b>Date</b>	<b>Topic</b>	<b>Reading</b>
Tues, Nov 28	Neuromarketing + Special Guest: Dr. Khara Ramos Special Guest: Dr. Anna Wexler	Readings posted on canvas
Thur, Nov 30	Neuromarketing	(readings sent via email)
Tues, Dec 5	Artificial Intelligence	Chapter 21
Thur, Dec 7	Special guest: Andrew Merluzzi	(no new reading)
Tues, Dec 12	Final Wrap-Up	(readings sent via email)

## **POLICY STATEMENTS**

### **Cell Phones, Smart Phones, and Laptops**

Our time together each week will be cell phone and smart phone free. When you walk into the room, you are expected to silence your phones. Exceptions will be made only in exceptional circumstances (which you should discuss with me before class).

Unauthorized use of laptops is also prohibited during class. You are expected to refrain from any computer use that is not germane to the class. Violation of the cell phone and laptop use policy will result in a reduced class participation grade.

### **Due Dates**

Due dates are important. Responses, reports, and projects are due on the date posted. Any response, report, summary or project, which is not submitted by or on the due date, will suffer a one-third letter grade penalty for each day late, e.g. 1 day late = reduction from B to B-. Responses, reports, summaries, and projects which are not delivered by the class session which immediately follows their due date will not be accepted.

### **The Honor Code**

The Undergraduate Honor Code pledge that each member of the university community agrees to abide by states: “As a Hokie, I will conduct myself with honor and integrity at all times. I will not lie, cheat, or steal, nor will I accept the actions of those who do.”

Students enrolled in this course are responsible for abiding by the Honor Code. A student who has doubts about how the Honor Code applies to any assignment is responsible for obtaining specific guidance from the course instructor before submitting the assignment for evaluation. Ignorance of the rules does not exclude any member of the University community from the requirements and expectations of the Honor Code.

For additional information about the Honor Code, please visit:

<https://www.honorsystem.vt.edu/>

### **Honor Code Pledge for Assignments**

The Virginia Tech honor pledge for assignments is as follows: “I have neither given nor received unauthorized assistance on this assignment.”

The pledge is to be written out on all graded assignments at the university and signed by the student. The honor pledge represents both an expression of the student’s support of the honor code and an unambiguous acknowledgment that the student has, on the assignment in question, abided by the obligation that the Honor Code entails. In the absence of a written honor pledge, the Honor Code still applies to an assignment.



All assignments submitted shall be considered "graded work" and all aspects of your coursework are covered by the Honor Code. Unless otherwise noted, all projects and homework assignments are to be completed individually unless otherwise specified.

Commission of any of the following acts shall constitute academic misconduct. This listing is not, however, exclusive of other acts that may reasonably be said to constitute academic misconduct. Clarification is provided for each definition with some examples of prohibited behaviors in the Undergraduate Honor Code Manual located at <https://www.honorsystem.vt.edu/>

- A. **CHEATING.** Cheating includes the intentional use of unauthorized materials, information, notes, study aids or other devices or materials in any academic exercise, or attempts thereof.
- B. **PLAGIARISM.** Plagiarism includes the copying of the language, structure, programming, computer code, ideas, and/or thoughts of another and passing off the same as one's own original work, or attempts thereof.
- C. **FALSIFICATION.** Falsification includes the statement of any untruth, either verbally or in writing, with respect to any element of one's academic work, or attempts thereof.
- D. **FABRICATION.** Fabrication includes making up data and results, and recording or reporting them, or submitting fabricated documents, or attempts thereof.
- E. **MULTIPLE SUBMISSION.** Multiple submission involves the submission for credit—without authorization of the instructor receiving the work—of substantial portions of any work (including oral reports) previously submitted for credit at any academic institution, or attempts thereof.
- F. **COMPLICITY.** Complicity includes intentionally helping another to engage in an act of academic misconduct, or attempts thereof.
- G. **VIOLATION OF UNIVERSITY, COLLEGE, DEPARTMENTAL, PROGRAM, COURSE, OR FACULTY RULES.** The violation of any University, College, Departmental, Program, Course, or Faculty Rules relating to academic matters that may lead to an unfair academic advantage by the student violating the rule(s).

If you have questions or are unclear about what constitutes academic misconduct on an assignment, please speak with me. I take the Honor Code very seriously in this course. The normal sanction I will recommend for a violation of the Honor Code is an F\* sanction as your final course grade. The F represents failure in the course. The "\*" is intended to identify a student who has failed to uphold the values of academic integrity at Virginia Tech. A student who receives a sanction of F\* as their final course grade shall have it documented on their transcript with the notation "FAILURE DUE TO ACADEMIC HONOR CODE VIOLATION." You would be required to complete an education program administered by the Honor System in order to have the "\*" and notation "FAILURE DUE TO ACADEMIC HONOR CODE VIOLATION" removed from your transcript. The "F" however would be permanently on your transcript."

**Disabilities**

Reasonable accommodations will be made for students with verifiable disabilities. “An individual may request assistance or reasonable accommodation by contacting University ADA Services (UADAS) or Services for Students with Disabilities (SSD) as appropriate (Virginia Tech, 2010, ¶ 4). The purpose, policy, and procedure concerning University accommodations of persons with disabilities can be located at:

[www.policies.vt.edu/4075.pdf](http://www.policies.vt.edu/4075.pdf)

**Principles of Community**

This course adheres to Virginia Tech's Principles of Community. If you have any questions, please speak with me or consult the Principles of Community website at <http://www.diversity.vt.edu/principles-of-community/principles.html>. A copy of the Principles can also usually be found posted somewhere in your classroom.